

Odd *Crambus pinellus* and *Hecatera serena* were picked up and these completed the list of captures for the week. We had taken most things that we came for except *Eutricha quercifolia* and one or two unexpected, such as *Heliothis dipsacea* larvae and *Coremia quadrifasciaria*—the latter in my experience always hard to get.

(To be concluded.)

Geographical Variation in *Hipparchia semele*, L.

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This species produces several distinct races, the most highly characterised of which are found chiefly on the outskirts of its area of distribution, whilst others, more or less intermediate, exist in intermediate regions. My first attempt, however, to detect the fundamental lines of variation in connection with the features of these races, and to classify them accordingly, so as to show as naturally as possible their relationships, left me for some time in much perplexity, because individual variation, producing also in most regions local variations restricted to limited areas, is so great as compared with the total scale of variability of the species, that for some time I failed to detect any character affording a sufficient amount of constancy and regularity to be reliable as an index. At last I grasped the fact that there does exist one, but that to follow it one must take into account an interesting phenomenon, which *semele* exhibits to an extent, I am not aware of, in this special way, in any other species. The leading feature is the network of fine streaks running in a perpendicular direction to the nervures on the underside of the hindwings; on broad lines these may be stated to be thick and densely packed together on the entire wing, or most of it, in forms, whether individual or racial, of damp localities and especially of northern ones; these streaks on the contrary become, as a result of dryness and especially in the south, gradually thinner and set further apart, and they get obliterated on certain zones of the wing. These zones, as a result, become broader and broader, and the chief of them, and the first to appear, is a band-like space running across the wing just beyond the end of the cell; it is nearly invariably outlined internally by the sharp streak present in most *Satyridae* at this level. Besides the network just described the dark pattern of the underside of the hindwings also consists in a lighter coloured brownish gray suffusion, which first makes its appearance between the two central streaks and along the line of eye-spots, in separate patches; these then spread and blend together, and may end by covering the entire wing. The network and the suffusion are usually both present, but their comparative development varies very much, and we shall see that some extreme races are characterised by the total, or a considerable, obliteration of one of the two. On broad lines one may say that the network is more developed in northern races and the suffusion in most of the southern ones. The important phenomenon, mentioned above, one must, however, bear in mind to be able to follow the main lines of variation of this species is, that in most regions it produces two forms so different from each other as to stand near the opposite ends of its scale of variation. What is more, the majority of individuals belong distinctly either to one or to the other, and intermediate forms are comparatively scarce; this takes place so markedly that as a rule

one form only is produced locally, whilst in a spot a few miles off only the other exists; thus each region exhibits two parallel races, and the two lines of variation are met with over the greater part of Europe; here and there the two forms are found together and with transitional ones. This interesting phenomenon is evidently a tendency of *H. semele* to split into two subspecies, somewhat as *Nytha fagi* produces locally either nymotypical *fagi* (= *alcyone*), or *major* (= *hermione*), or transitional races, and somewhat as *Erebia ligea* produces *ligea*, or *philomela* (= *euryale*), or transitions. The two extreme lines of variation of *H. semele* can be described as follows:—

Line A: Fulvous areas of upperside in both sexes very extensive, but usually of a rather cold yellowish tone; in the male the forewing, as well as the hindwing, is crossed by a broad band of uniform colour. On the underside of the hindwing the diffused dark shadings tend to be pale and limited in extent, or even nearly absent, so that, when the dark network is thin, the white ground-colour remains uncovered, and usually a broad band-like space of this colour is to be seen across the whole wing.

Line E: Fulvous areas of upperside in both sexes, but especially in the male, very reduced, usually of a warm, reddish tone; in the male the forewing often lacks all traces of fulvous; as a rule there are two or three spots of it, very limited in extent, just outside the eye-spots; on the hindwing of both sexes all that is left is a series of separate spots, arrow-headed in shape and of a very intense reddish fulvous; the rest of the band is only vaguely shadowed by a whitish clouding. On the underside of the hindwing the gray or brownish-gray suffusion, described above, tends to be very extensive so that, when the network is thin or obliterated, the wing remains darkened all the same; the white band-like space may exist, in northern races especially, but it is narrow, and more often it only exists on the fore part of the wing; in extreme southern ones it is nearly or entirely abolished.

When the existence of these two lines of variation has been grasped, the classification of the majority of the races works out naturally and easily, as successive grades along them. A few races, however, stand apart and do not fall in with those of either line, evidently being quite as distinct from both as these are from each other. I think the most correct way of expressing their relationship to them is to designate them as three other parallel lines, as I will endeavour to show clearly by a synoptic table at the end of this paper which will also help to understand the following descriptions.

Line B. I will thus call the line of race *aristaens*, Bonelli, which contains no other, so that its grades simply consist in the individual variations of this one race. These however are so broad that they make up for it by covering entirely the corresponding grades of the other lines. I have found it well worth preserving in my collection a series of 147 males and of 41 females, to show the extent of variation in a single locality on Mt. Capanna, in the Isle of Elba, where this race is found, besides Sardinia, whence it was described, and Corsica. The characteristic of this line is that it combines the upperside characteristic of line A with the underside one of line E. The extent of fulvous is, in fact, even greater than in any race of line A, on an average, whereas the extent of dark suffusion on the underside is usually such that the white band-like space is always very reduced and

often entirely abolished, as in line E. The extent and the thickness of the network of the underside is so variable that it runs from the heavy and complete one of grade I, recalling the northern *scota*, to its nearly total obliteration, as in the southern *mersina* or *algirica*, so that the wing is then of a uniform grayish brown, due to the suffusion. It is noteworthy that this combination of an extremely reduced upperside dark colouring with a very developed underside one, is the very characteristic of race *tigelinus* of *Pararge megera*, L., which is found in the same localities, and which also deviates from the more usual continental line of variation on this account. Other characters which *aristaeus* has in common with line E are the tone of the fulvous, very bright and reddish, and the fact that on the forewing it is usually much less extensive than on the hindwing. A peculiarity of this race is the way that colour shades off gradually towards the base of the wing, which it often reaches, especially on the hindwing, whereas in the other broadly fulvous ones it always ends sharply, forming a band.

Line C. We must, I think, consider this line on account of a feature exhibited by race *algirica*, Obth., of North Africa, which is never found in any other race even as an individual variation, so that it cannot be placed in the other lines; the fulvous spots on the forewing of the male are similar to those of the female of all the other races, (except *aristaeus* and *siciliana*), because the fulvous band is wide and sharply outlined, but broadly interrupted by a dark band on the third median nervure. On the hindwing the band is also broad, as in line A, and its tone of colour is often cold, as in this line; on the underside of the hindwings, on the contrary, the dark suffusion is very broad-spread, as in line E, only leaving, as a rule, a narrow and irregular white band uncovered, and it is of a characteristic warm chestnut tinge, not veiled with black, because the dark network is always extremely reduced; *algirica* constantly corresponds to the last grade in this respect, and contrasts with *aristaeus* by its very limited individual variations. A peculiarity is the sharpness and intensity of the two black streaks, which cross the underside of the hindwing; they are broken by unusually sharp angles; they are more accentuated also on the forewing. In some females the extent of the fulvous on the upperside is considerable, and there is a diffused patch of it in the middle of the wing, as in race *siciliana* and in the less highly characterised *aristaeus*. This African race is remarkably small. Rothschild remarks in *Novitates Zool.*, XXL, p. 308 (1914), that the form found at Guelt-es-Stel, in Central Algeria, "is very brilliant, considerably more so than the series from Blida, Les Glacières." I notice, in fact, a remarkable difference between a series I have from Lambèse and the specimens of Sebdoou and Géryville, figured by Oberthür in *Ét. Lép. Comp.*, X., fig. 2317-21. The former are very much less conspicuous: the fulvous is dull and cold in tinge, and so limited in extent that some females on the upperside differ in no way from the *jubaris* and nymotypical *semele* of Central Europe. As Oberthür, in the few words of his original description of *algirica*, in the *Ét. Ent.*, I., p. 27 (1874), gives "Daya, Lambèse, and Collo," as localities for it, I conclude he had both the dull and the brilliant races before him, and I propose restricting his name to the one he figures in 1914, and naming the Lambèse and Blida one *PALLIDALGIRICA*, mibi.

The races of the Iberic zone seem, on the whole, to constitute a

gradual transition from those of France to *algorica* of Africa, just as might have been expected, and as in the races of many other species. I cannot pretend to work them out thoroughly here, because it would need considerably more material than I have at hand, but I can state that the race of Cuença in Nueva Castille and of Canizares is distinctly intermediate, and that other specimens I have from Barcelona are more similar to the French races. The Cuença race stands well apart from any other European race I have seen, and points to *algorica* by the following characters: small size, elongated and narrow wings; apex very pointed, outer margin straight; distance between the nervures less than in the Italian and other southern races, so that in the female the fulvous spots are lesser in extent; the latter are also rather dull and cold in tinge, with a shaded outline, very different from the bright, clear, clean-cut spots of the more eastern races of the south, and resembling more the northern ones in this respect. In the male these fulvous spots are not perceptible enough to show if they exhibit the characteristic female-like features of *algorica*. I presume this would show better in the races of Southern Spain. What is important is that the underside of some individuals has most markedly the same aspect as that of *algorica*, whilst no other European race exhibits it even as an individual variation. I propose for this race the name of *HIBERA*, mihi.

Line D consists in a combination of characters which diverge from the more usual ones of lines A and E in a way exactly opposite to that of the *aristaens* line B; in D, in fact, the fulvous markings of the upperside are limited in extent, as in line E, but their tinge is pale and cold as in A, and the underside of the hindwings also resembles A. I know two races which afford these features. At high altitudes in the Sibillini Mts. (Marche in Central Italy), in alpine surroundings, a distinct mountain race is produced, which I propose calling *APENNINIGENA*: size as small as the English race; fulvous of upperside pale yellowish in tone, as in the nymotypical *semele* of the north, and the extent of it also similar to it in both sexes; eye-spots remarkably large; underside of hindwings very light, rather like race *teres*, and belonging to line A rather than to E by its light gray and limited suffusion, which in the males leaves a broad white area free.

I do not know the Greek race described from the Taygetos as *senthes*, Frühstorfer (*Int. Ent. Zeit.*, April, 1908, p. 11), but his description of an upperside, "very poor in pattern," females with "a dull, pale, ochre yellow and very narrow band on hindwing," and of an underside "not much darker than in *teres*, and with a median band nearly as broad," suggests features similar to those of *apenninigena*; its size, however, is said to be large. This is presumably the hinterland race, most widespread. No doubt, however, more than one race is produced in the Balkanic zone. Staudinger in *Horae Soc. Ent. Ross.*, VII., p. 68 (1871), for instance, records a different one from the Isle of Naxos, which he describes as transitional to *aristaens*.

(To be concluded.)

NOTES ON COLLECTING, etc.

ABRAXAS GROSSULARIATA VAR. NIGROAPICATA, ETC.—To prevent confusion in the future, it seems desirable to point out at once, that